Television's Teletext

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Contents

In England and Elsewhere

In the late 1960s, as talk began of "wired cities" and "wired nations" to express the notion that many new forms of computer telecommunications were imminent, investigations also began into the uses of portions of broadcast signals for transmitting digital information. In England, Japan, and the United States, to name a few countries, the start of teletext became visible. But it was the English system that reached maturation first and became the guide for other systems, and therefore it is the English experience that will be described first in this survey of teletext services in other countries. (Teletext in the United States is the subject of Chapters 3 and 4.)

England

Sometime during the latter part of the 1960s, engineers at the British Broadcasting Corporation's Designs Department began what Gwyn Morgan terms the "first rumblings of teletext" [1]. At about that time, broadcasters in a number of countries were working on methods to utilize the vertical blanking interval for various control signals. At the BBC, aware of the control signal applications, researchers were generally looking for a way to deliver information to home-based printing devices as a service to the hearing-impaired. The primary problem was the printer, because the BBC wanted a device that would be quiet, unobtrusive, free of maintenance, and inexpensive. The transmission technique was already developed, namely, coding the data into the vertical blanking interval in the same way that the control signals are transmitted.

In 1968, as computer terminals were being built using semiconductor technology to generate characters on the screen, it became apparent that this might solve the problem of finding an inexpensive, easily operated printer. Instead of a hard copy printer, the characters could be displayed on a television screen using the semiconductor technology that was becoming available and affordable. Having accepted the idea that the digital information would appear on a television screen equipped with character-generating circuitry, the BBC engineers returned to the examination of the transmission side of the project.

One of the alternatives to inserting the data in the vertical blanking interval was to impress them onto a subcarrier in the television signal, and this method then underwent testing in the BBC laboratories. Eventually though, the experimenters concluded that use of the vertical blanking interval was the better method, creating less disturbance to an existing television signal.

At the same time, the BBC was actually thinking in terms of two different services. The first service would be subtitles or captions for video programs, visible only on television sets with the appropriate decoder. The working title for the service was "teletitles." The second service using the teletext technique would be the delivery of a full screen of text, again to sets with the appropriate decoder, with the tentative title "teledata." Because both proposed services were to use the same teletext technique, it soon seemed advantageous to design the two systems to use the same decoder. Before long, the two systems were essentially one and became known as "Ceefax."

By 1972 the BBC was ready to announce the Ceefax project and to encourage some industrywide support for the system. Obviously, the success of the Ceefax project would depend upon the willingness of television set manufacturers to produce sets with internal teletext decoders, or to produce external set-top adapters. In the same vein, the support of the independent television stations (ITV) would also be important, because the independent stations had been concurrently working on their own version of a teletext system. A committee of representatives from the BBC, ITV, the semiconductor industry, and the television manufacturing industry was established to design a suitable system standard. During 1973 the committee discussed and tested all the variable features of the proposed techniques, including different numbers of rows and columns of text, different methods of coding the text so that it would be displayed at the proper location on the screen, different techniques for creating the digital codes themselves, and a range of data rates (i.e., the amount of digital information that can be transmitted in a given moment). The upper limit on the data rate is more or less dictated by the bandwidth of the television signal, and data rates from 3.5 megabits per second to over 6 megabits per second were tried. (In England, a television channel is 8 MHz wide, with the vision portion being 5.5 MHz.)

The result of the committee's year or so of effort was the 1974 *White Book* giving the public specifications for teletext service in the United Kingdom. This specification established the format of the teletext page (i.e., a maximum of 40 characters per row and a maximum of 24 visible rows, with an additional 8 nonvisible rows for later enhancements or expansion), the coding techniques for packaging the character data (i.e., an extra 5 bytes per row for addressing information), and the data rate of 6.9 megabits per second. The data rate is actually a burst rate, meaning that when data are being transmitted, they go at that speed, but because there are also moments when no data are being transmitted, the effective data rate is considerably less.

In addition to the technical committee's work, a government committee on the future

of broadcasting also examined and endorsed the teletext concept. Thus with careful preparation and cooperation, the introduction of teletext services seemed assured.

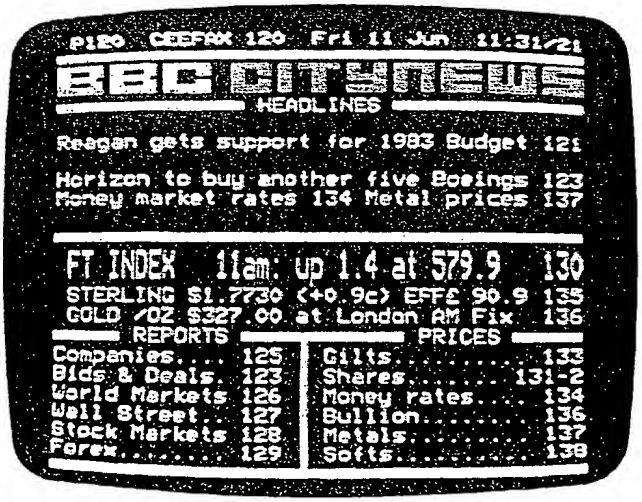
During the years that this was taking place, the British Post Office was developing its own videotex system, later to be called "Prestel," also to utilize home television sets as the display device, although using telephone lines to connect the sets to a computer. Because, again, it seemed that similar coding standards would benefit all participants, the British Post Office agreed in 1974 to adopt the teletext specifications for format, colors, character sets, and display features. (Prestel is discussed again in Chapter 6.)

Almost immediately, the BBC began broadcasting a nascent Ceefax service, and the independent stations began their own teletext service called "Oracle" (see Figure 2.1). The name Ceefax may have come from "BBC-facts" crossed with "see facts," while the name Oracle was formed from Optional Reception of Announcements by Coded Line Electronics. Actually, the BBC had been broadcasting experimental teletext since mid-1973 using a rather cumbersome page creation system whereby a journalist typed the pages on a machine that created a punched paper tape that was then fed into a memory device.

The first two years of Ceefax and Oracle were a trial period, approved by the government in late 1974. During 1975 and early 1976 the BBC and ITV were broadcasting teletext on a regular but limited basis. At the BBC, for example, owing primarily to the physical limitations of the teletext equipment, the Ceefax service contained only about ten pages of text (although pages might change throughout the day) on BBC1 and a similar number on BBC2. The subject matter tended to revolve around news, reports of traffic conditions, and stock market reports.

This was also a period of continued technical testing of the teletext technique itself and of the announced specifications. During this time and over the next several years as well, BBC and ITV engineers measured over 25,000 parameters affecting teletext trans-

Figure 2.1 Sample Ceefax page, showing financial headlines. *(Courtesy of the BBC's Ceefax Service.)*



missions [2]. The ITV group, for example, sampled the effects on teletext reception attributable to electromagnetic noise, ghosting, cochannel interference, and the like. In general, the results indicated that over 94 percent of the sample homes could receive teletext without difficulty. Some of the measurements were also conducted on wired, or cable, television systems (e.g., in apartment complexes), because about 10 percent of U.K. homes receive their television that way; and similar positive results were found except for some HF (high-frequency) distribution systems. But a few things did need correcting. In the early days of ITV's teletext transmissions, an audible buzz was heard on television sets in certain areas until ITV established stricter controls over the data amplitude.

Because of the trial nature of the teletext services, it could still be said in mid-1976 that there was no widespread use of teletext by consumers, and most people's experience with teletext, if any, was an occasional glance at a teletext page on a television set in some public place, such as a television rental store.

The combination of continued testing and experience with a live service led to the publication of a second specification in 1976. This second set of standards permitted some features to be added that would improve the teletext display, such as allowing graphic representations to contain colors adjacent to each other. This was an improvement over the previous system of leaving a blank spot on the screen where a color code had been inserted to change the display from one color to another. The government gave the final approval to teletext on November 9, 1976.

According to Colin McIntyre, the BBC journalist responsible for the beginnings of the Ceefax service, the concepts guiding the service's content and structure were patterned after radio [3]. Radio, like current teletext, reaches only one of the senses, and the radio format of capsulized information seemed most applicable to teletext. In addition, the BBC saw teletext as an extension of its ongoing information gathering and dissemination via radio and television. Thus teletext at the BBC would not be an entirely new service seeking to distribute types of information that the BBC had not previously been concerned with. Instead, the Ceefax editors would make use of the existing, and extensive, news and information gathering activities of the BBC. The distinction between content or editorial orientation and the teletext technique remains, however, and the BBC brand of teletext in the early years, while often cited as the prime example of what teletext means, is certainly not indicative of the range of possible teletext services, as will be seen throughout this book.

The growth of teletext in the United Kingdom following the trial years may turn out to be indicative of teletext growth in other countries, even though there are arguments that other countries will move faster. On the one hand, we might say that teletext growth in England, where over half the population rents or leases television sets rather than buying them, will ultimately be faster than in countries where the population primarily purchases sets. On the other hand, initial growth in England was hampered by the lack of a ready supply of the custom-designed semiconductor circuits, or chips, used in manufacturing the decoders, while other countries may be spared that problem. The net result of both positive and negative factors may be that the experience in England will not be unlike the introduction of teletext in other industrialized countries.

At any rate, the number of teletext-equipped television sets sold in Great Britain from 1974 to 1978 totaled fewer than 5,000. But in 1979, the first year after teletext sets began being manufactured on a production line basis, the number of teletext sets in use rose to 40,000. The following year that number more than tripled, by the end of 1981 there were over a quarter of a million, and by late 1982 there were over a half million

sets able to receive Ceefax and Oracle. And that number is currently growing at about 8,000 sets sold per month. This represents the beginning of rapid growth, although realistically teletext is still a marginal entry in the British television scene because teletext sets account for only about 3 percent of the total number of television households, and a 1981 survey revealed that about half the population had not yet heard of the names Ceefax and Oracle [4].

Naturally, the growth of the number of teletext sets in use sparked a number of viewer surveys to determine the characteristics of the teletext audience. At least three such surveys have been undertaken—one by Communications Studies and Planning, Ltd., a British research firm; one by Philips Video, a manufacturer of teletext equipment; and one by the BBC itself [5]. All three surveys concluded that teletext viewers belonged to upper-income categories (e.g., professionals and managers). One of the surveys explained that the typical teletext viewer is young and affluent and already accustomed to watching over 30 hours of television a week.

Two of the surveys attempted to find out just how much time is spent watching the teletext service. Both concluded that nearly two hours per week are spent reading teletext pages. In practice, the two hours are composed of several teletext viewings per day, where four or five pages might be read at a time. One survey suggested that the teletext services are looked at, on average, over ten times per day for short periods.

As might be expected, teletext viewing follows usual television viewing patterns over the course of a day, with light use during the morning, a slight rise in the afternoon, and the bulk of the viewing (or reading, in this case) in early evening.

Regarding the most popular pages on the teletext services, the overwhelming favorite was news for BBC1 and ITV's Oracle. However, BBC2, which has a different style of teletext, is watched more for the teletext games and puzzle pages. Program schedules ranked second in popularity on BBC1, while sports news ranked second on Oracle, and the newsflash facility was the second favorite on BBC2, rivaling the game and puzzle pages on the latter network. (The newsflash facility gives the viewer the option of choosing to see teletext newsflashes cut into the normal video; thus a viewer continues to watch the normal program and sees the newsflashes only as they are transmitted, often with a note that the complete story can be found on another teletext page. A viewer who does not wish to see newsflashes, of course, can elect not to.) Other favorite pages were financial information, weather and travel news, and farm and garden information on BBC1; consumer news on BBC2; and weather, travel news, and financial news on Oracle. When asked about what other items they would like to see, at least a third of the survey sample mentioned local event information and local news.

Another survey, a small project involving interviews of some 30 U.K. teletext users, was conducted in the summer of 1981 by William Herring, a graduate student at New York University [6]. Although the sample size—the number of people interviewed—was quite small, the sample showed some similarity with national averages (e.g., 65 percent of the sample rent their television sets, 75 percent were male, and the most popular teletext pages were news, weather, sports, and entertainment information). Interestingly, the number of times per day for which the interviewees said they switched to teletext hovered about two to four, even though several said they switched to teletext only once per day, and several others claimed to watch teletext eight to twelve times per day. The average length of any one teletext "session," according to most of the interviewees, was anywhere from 1 to 15 minutes (seven people said 1 to 5 minutes, eight people said 6 to 10 minutes, and nine people said 11 to 15 minutes). Again though, a handful of interviewees reported that their average teletext session lasted from one-half

hour to one-and-one-half hours. Certainly, larger surveys will be needed to confirm or deny these figures as representing national averages.

Both the BBC and ITV began to promote actively their teletext services in the early 1980s to a much greater extent than during the previous six years. The BBC's primary procedure for promotion was to begin what they called "In-Vision." In this service, teletext pages are broadcast as normal video programming during those parts of the day when the BBC is not usually on the air. In this way, viewers with any type of television set can see Ceefax pages, although the pages roll by without any selectivity on the part of the viewer. (This technique is also being used in Chicago on WFLD–TV, which is described in the next chapter.) The British government also took a hand in promoting teletext and helped to finance a National Teletext Month in October 1981.

At the same time, ITV launched a $5 million campaign to advertise Oracle. This was ITV's first major effort to promote their teletext service and was used to announce the arrival of paid teletext advertising on Oracle itself. The success, or lack of it, of advertising on teletext pages will probably be a significant factor affecting teletext in the United States, and the Oracle experience is being watched closely. The Oracle rate card for advertisements, published in late 1981, provided for two classes of ads—a full page for about $800 per week, and a fractional page (two lines of text on an existing page) for $600 per week if the sponsor selects the page or $400 per week if Oracle selects the page. In addition, Oracle contains an index to the advertisement pages, and short announcements on other pages alert viewers to the index. Because teletext pages can be changed very easily, Oracle offered to change the text of any ad during its run for an additional $20 per page or partial page.

Besides being the lead service in teletext advertising, Oracle also took the lead in regional teletext. The concept of regional teletext means that stations in a geographic area can insert their own teletext pages into the nationally distributed magazine. This was first accomplished in late 1981 as Scottish Television, one of the ITV stations, prepared to originate about 60 pages of local information.

In general then, British teletext provided the early model for teletext services, and British equipment was often used for teletext systems in other countries. The Ceefax and Oracle services provide news, weather and sports information, games, puzzles, recipes, horse racing results, fictional stories broadcast in installments over a number of days, personalized messages, and special interest group information such as prices and crop disease warnings for farmers.

The British systems have also continued to grow in capacity and capability. The BBC's initial service used an Alpha LSI–2 minicomputer. This was replaced in 1979 by a set of three PDP 11/34 minicomputers from Digital Equipment Corporation, with capacity for 10,000 pages of text and graphics. (Of course, a teletext magazine at any one time still contains only about 100 pages.) The system also has several automatic links to news services, the London Stock Exchange, and the national weather service, so that information can be fed into the teletext system without being retyped. Even color radar maps are automatically transferred from the weather service to Ceefax.

Other enhancements that have been added include fine-line graphics, full-color photographic-quality pictures, and telesoftware. The latter term refers to the use of the teletext pages to broadcast computer programs and data to television sets equipped with a microprocessor, or to a microcomputer with a teletext decoder. In the late 1970s, Oracle engineers began to test the technical feasibility of telesoftware in the belief that this could be a way to support nonuser-programmable microcomputers in homes [7]. People could have the power, and fun, of using microcomputers without knowing a

thing about programming. The programs for games, educational courses, financial analysis, and the like would be broadcast using the vertical blanking interval, and the receiver would be a smart but familiar television set. Whether or not telesoftware develops in that way remains to be seen, because the basic concept can be accomplished with cartridges, or with programs downloaded over a cable television system, as is the case with Playcable and Mattel's Intellivision in the United States (see Chapter 4).

The transmission of full-color "photographs" via the vertical blanking interval has also been demonstrated, with the expectation that eventually the U.K. teletext systems will begin transmitting both single photographs and sequences of photographs, as a sort of slow-scan digital television [8]. At present, however, the transmission of a full-screen photographic picture using teletext is equivalent to broadcasting about one hundred "normal" teletext pages. In addition, other enhancements call for the transmission of separate data "channels" unassociated with the display portion of the teletext page.

Several other developments involve the use of subcodes to identify each page. In the current U.K. teletext system there is room for several million subcodes. These can be used to provide unique addresses, so that certain coded pages can be seen only by a person, or group of persons, with a decoder that has the proper address built in. Or the subcodes can be used to digitally classify the pages so that a viewer can choose which pages to see by selecting a category, rather than an individual page.

The current generation of teletext sets in Great Britain contain an internal digital memory of one thousand bytes, enough to hold a single screen or page of text. But as the cost of semiconductor technology declines, additional memory can be built into the set. This will allow the viewer to locally store a set of pages, which could drastically reduce the waiting time necessitated by the broadcast nature of teletext. In fact, a memory of, say, one million bytes could hold a thousand pages, perhaps automatically selected and stored using commands preset by the user.

The use of Ceefax and Oracle for subtitling, or closed captioning, has also continued to develop. Here the problem is not really a technical one related to teletext—the system handles several streams of subtitles easily—but a greater problem related to converting speech to print in real time. The television programs recorded prior to transmission can certainly be subtitled at a much slower pace, with subtitles keyed to individual frames and coded for color and location on the screen. But the captioning of live transmissions requires some extremely fast procedure for converting sound to accurately printed words. The BBC has experimented with typists using a stenographic machine linked to a computer, such that the computer can search its memory for the correct spelling of the word and phrase symbols generated by the stenographic typists. The result has not always been as desired; a live telecast of a speech by U.S. President Ronald Reagan carried in the captions continued reference to "free dumb " (freedom). At ITV, Oracle has reportedly captioned some live programs simply by hiring an extremely fast typist who managed to get most of the spoken words into the captions.

To a great extent, the development of teletext in England spurred the introduction of teletext services elsewhere that could begin with some of the features that started out as enhancements to the U.K. systems. Almost as soon as the British system became a public service, engineers in other countries began developing better systems, that is, systems that would overcome minor problems with the first versions of the U.K. system. It has been said that by the end of 1978, representatives and interested parties from over one hundred countries had visited the BBC and ITV to see just what teletext was all about. Some of these researchers returned to their respective countries to apply what they had learned to change existing information delivery systems or to create new sys-

tems. For example, one of the simple but important features of the U.K. system that others admired was that, in one way, the system provided an immediate response to a viewer's command even though the viewer might still have to wait for a page to appear. This was accomplished by reserving a portion of the top line of each page for a page-number display. When a viewer selects a page, the top line display immediately changes color and begins showing in rapid succession the numbers of the pages being broadcast. The viewer can see the numbers flipping by and know fairly well when the desired page will appear; this has the effect of reducing the perceived waiting time for page access.

Part of the rise of competitive systems elsewhere, then, came from this ability to learn from the English pioneers, but another part is also due to the fact that television technical standards differ throughout the world, and the English system was originally designed for one particular standard to accommodate one particular written language. Thus there was a lot of debate, for example, on how well the British teletext system based on a television standard of 625 scan lines and 50 Hz operating power could be converted to, say, the U.S. system of 525 scan lines and 60 Hz operating power. The conversion was certainly possible, as later chapters will describe, but some changes did have to be made. And in countries with different, and larger, character sets for written language, still more changes had to be made. On the other hand, in countries with the same television standard as Great Britain's, and similar character sets, the adoption of U.K. teletext methods has been relatively simple. By 1981, as teletext began to grow substantially in Great Britain, the U.K. form of teletext was being used in about a dozen other countries.

Japan

In Japan, the development of teletext goes back about as far as it does in Great Britain. But the Japanese effort did not result in the early introduction of a public service. Instead, teletext is only one part of a wider series of technical and social experiments with new information delivery systems, including such means as videotex via fiber optic cables.

The first teletext system in Japan was probably developed by Matsushita Electrical Industrial Company in early 1969. Like the early British efforts, this was an attempt to create a system of broadcasting digital information to printing devices. And also like the British experience, the major broadcasting organization was involved. Matsushita was working under the direction of the Japan Broadcasting Corporation (NHK—Nippon Hoso Kyokai). By 1971, several years before the British had brought the Ceefax/Oracle system and the Prestel system (which uses telephone lines) together under one standard, the Japanese were developing a television set that would receive both broadcast teletext and telephone-delivered videotex.

In 1976, the first formal technical guidelines for teletext were proposed by NHK, and in 1978 experimental teletext broadcasts were begun (see Figure 2.2). Teletext has continued on an experimental basis, with preparations for a commercial service to begin in late 1983.

But even though the Japanese have proceeded rather cautiously in approaching a teletext service, they have been centrally involved in technical teletext work in other countries. Japanese engineers from Sony Corporation took part in the 1978 CBS teletext tests, and Sony has supplied teletext-equipped television sets for Great Britain.

One of the major characteristics of Japanese teletext and videotex systems, and the

Broadcasting, purchased KDNL–TV in St. Louis with the intention of converting it to subscription television service. As part of that service, Cox has been investigating several types of teletext systems, including Oak's. Also like Oak, Cox has similar interests in text services on cable television and developed its own videotex system, Indax, for use on coaxial cable systems. Prior to developing an actual teletext service, whether on an STV station or a regular commercial television station, Cox reportedly surveyed television viewers and found that one-third would like to see some form of teletext service to access news, weather, and consumer information [6].

Given the subscriber-supported nature of STV and MDS broadcasting, it is not difficult to imagine the teletext technique being employed for a wide range of data transmission purposes as long as the over-the-air method is less expensive or less troublesome than wire- or cable-based delivery systems. At least one company, Star, Inc., of Santa Monica, California, has used a form of teletext on an MDS system to distribute text to hotels and motels. The trial service, established in Richmond, Virginia, used one line, line 25, of an MDS channel carrying pay TV and news on the video portion. The digital information multiplexed into the signal was composed of airline and other travel information. A single decoder was placed at a motel, where the digital information was decoded and placed on another channel as pages of rolling text.

Another MDS company, Microband Corporation, now owned by Tymnet, Inc., has also been playing with the idea of MDS teletext for several years. In 1979, Microband did some preliminary work with the French Antiope system and has continued to examine teletext as a way to distribute any kind of data on the local level (i.e., within range of an MDS transmitter and linked to national networks such as Tymnet's packet-switched data network).

Mass Market Trials

Beginning in 1981, broadcast teletext trials designed to assess the mass market potential for teletext services cropped up across the country. Almost all of them began broadcasting roughly the same mix of general interest information, but each also incorporated unique features. As a group, the various trials used just about every type of teletext system then available—French, British, Canadian, and U.S. These trial services began in Los Angeles, Chicago, and Washington, D.C., and later in San Francisco, Cincinnati, and Seattle.

Los Angeles

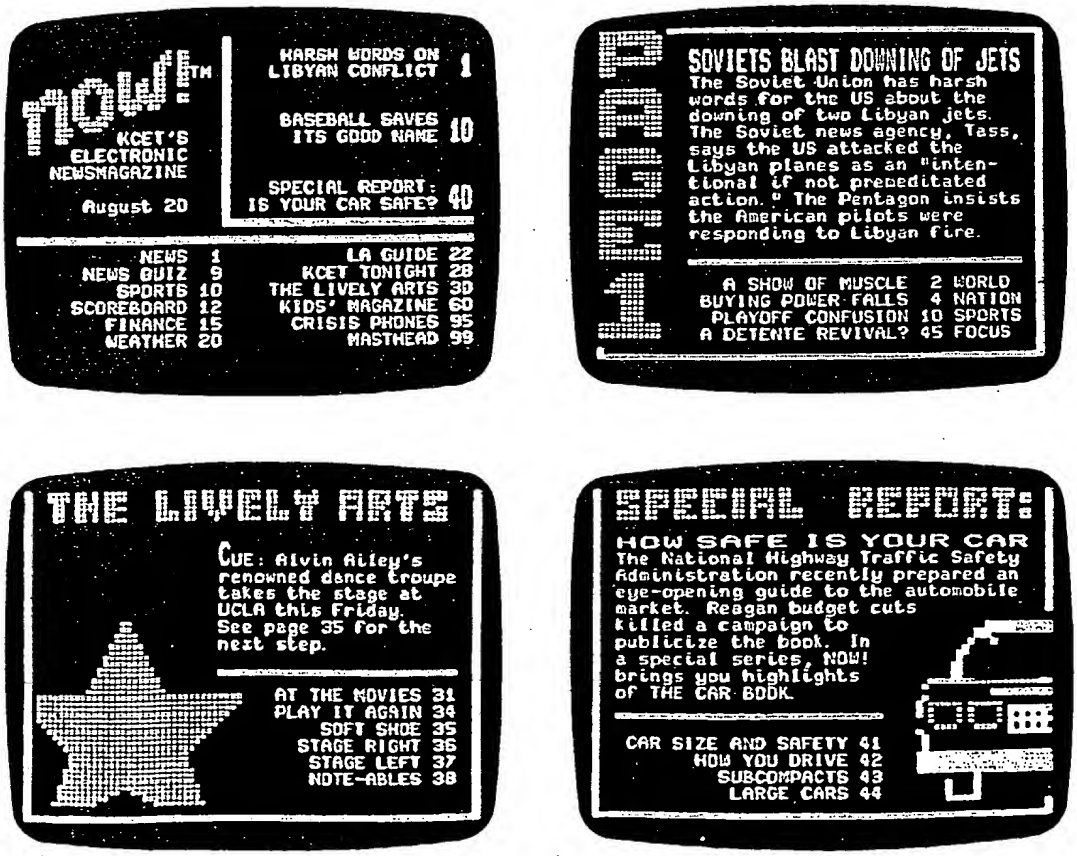
Los Angeles is the primary teletext location because of the number of television stations involved. The PBS station (KCET–TV), the CBS station (KNXT–TV), and the NBC station (KNBC–TV) are all taking part in broadcasting teletext services to a very small population of teletext-equipped television sets. The teletext efforts are also aided by the captioning services of the WGBH Caption Center, using the teletext system, not the line 21 method, to provide closed captions. The particular technology (and equipment) used by all these stations is the French, spurred largely by the fact that Télédiffusion de France lent more than $1 million worth of equipment to the trials.

The PBS station, KCET, had been interested in teletext for several years and had permitted teletext signals to be broadcast in a test mode as early as 1979. In 1980, the station received a grant of $100,000 from the Arthur Vining Davis Foundation to continue developing a teletext project, and in April 1981 KCET began broadcasting a tele-

text magazine called "Now." The stated purpose of the trial is to assess uses for teletext, and in particular, uses that stand apart from entertainment and advertiser-supported services [7].

As shown in Figure 3.1, the range of information on Now is indeed wide, from news and weather to a trivia quiz. But there are several features of an instructional or educational nature. One such feature supplements educational programs broadcast principally for in-school use. During the trial two programs, "Thinkabout" and "Inside/Out," were chosen for augmentation with textual material supplied via teletext. Students use a teletext-equipped television set in the school library or similar public place to step through additional pages of information. In the same vein, other KCET educational programs of more general interest are also supplemented with teletext pages, viewable by people with teletext decoders. (Approximately one hundred such sets are to be available in Los Angeles during the trial period; these sets are able to receive the teletext signals of any of the three stations broadcasting teletext services, because all use the same technology.) Quizzes are also part of the teletext service utilizing a feature of many teletext systems called "reveal." The "reveal" feature allows text to be present on the screen but blanked out until the viewer presses a "reveal" button on the decoder control. Other instructional pages are designed for children (the "Popsicle" pages), for

Figure 3.1. Sample pages from KCET's teletext service. *(Courtesy of KCET/Los Angeles Teletext Project, photo by Mitzi Trumbo.)*



teachers (to read about upcoming instructional programming), and for schools (to receive administrative information).

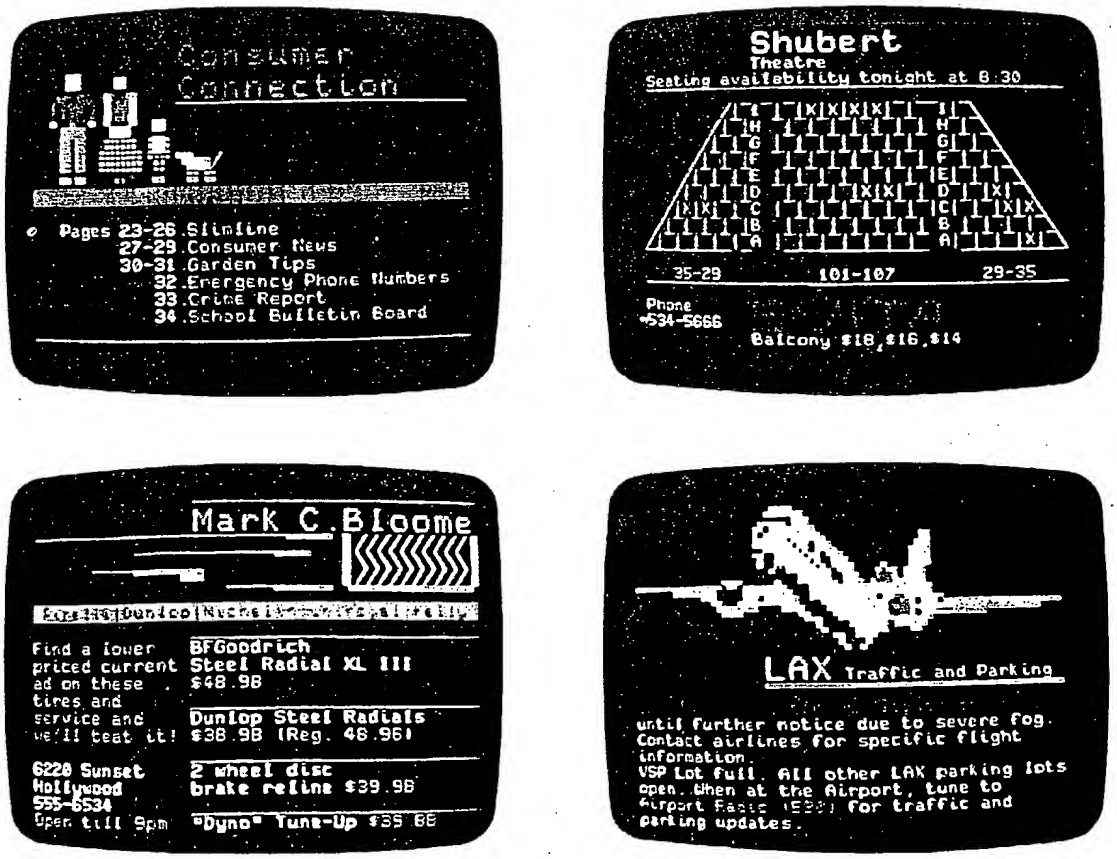
Understandably, some of the experiences with the educational portions of Now have been less than satisfactory. With only a few sets in a school, teachers tended to use teletext as a group activity by leading a discussion that would rely upon or reinforce pages of text and graphics. But in these situations, students did not have individual control over the selection of pages, and a similar process could have been much more easily followed using a set of overhead displays instead of the teletext pages.

However, the ultimate educational benefits of teletext will be weighed when the trial service is completed in 1982 or 1983. During the trial, the educational applications are being guided by a steering committee of representatives from the Los Angeles Regional Educational Television Advisory Council, the Los Angeles Unified School District, and KCET.

KCET shares the teletext editorial center, the location where a Honeywell minicomputer is located as the hub of the teletext origination effort, with KNXT, the Los Angeles CBS station.

The CBS network had, of course, been experimenting with teletext for a few years before announcing in late 1980 that a teletext trial would be initiated at KNXT using the French Antiope system supported by CBS in the filing before the FCC.

Figure 3.2. Sample pages from KNXT's teletext service. *(Courtesy of CBS, Inc.)*



The KNXT magazine is called "Extravision" and, as does Now, contains a total of about 75 to 80 pages at any one time (see Figure 3.2). As Table 3.2 indicates, the broad range of general interest information covers news, sports, weather (including smog and ski reports), financial reports, travel information, and simulated advertising. The advertising is not "real" in the sense that, under KNXT's experimental teletext authorization, charging for advertising is not permitted. However, companies that indicated an interest in advertising on teletext and are taking part in the trial service include American Airlines, Coldwell Banker, Wilson Sporting Goods, Litton Industries, Merrill Lynch, and Ticketron.

Both KCET and KNXT (including the CBS organization) have worked closely together in what is essentially a joint project, even though both create their own separate teletext magazines. The stations share the same minicomputer and the same set of editing terminals and broadcast to the same set of teletext-equipped television sets, which are RCA sets modified by project engineers to incorporate teletext decoders. The screen format is 20 rows of 40 characters, and graphics are the "mosaic-six" style (i.e., any character-size space can be divided into six smaller squares, or two columns of three).

One of the additional features of KNXT's broadcasts is closed captioning, subtitled by the West Coast office of the WGBH Caption Center. As mentioned earlier, CBS has consistently refused to use line 21 captioning in the belief that a true teletext system offered better captioning capabilities. Thus the KNXT trial gave CBS a chance to demonstrate its position by hiring the WGBH Caption Center, which had been captioning programs for about ten years and had also experimented with the Antiope teletext system to prepare captions for selected CBS programs.

Table 3.2. Sample Index for KNXT's Teletext Magazine

Page	Contents	Page	Contents
1	Title	33	School Bulletin Board
2	Master index	34	On the move
3–8	News update	35–36	LA freeways
9	Weather index	37–38	Airlines/flight information
10	National weather map	39–41	Airlines/travel packages
11	LA today and tomorrow	42	LAX Traffic and Parking
12	Smog watch	43	Road advisories
13	Marine weather/ski report	44	Sports line
14	Recreational weather (mountains and deserts)	45	Sports briefs
		46–47	Sports day
15	Financial spotlight	48–49	At the track
16	Business briefs	50–52	Sports scoreboard
17	Dow Jones averages	53–62	$ales and $pecials
18	NYSE 10 most active	63	Entertainment spotlight
19	Amex 10 most active	64–65	LA calendar
20	Market diary (volume, advances, declines)	66	Weekly Variety's top ten
21	Consumer Connection	67–68	Today on 2 (TV schedule)
22–23	Slimline (diet menu)	69–74	Box office/Ticketron
24–25	Slimline (diet recipe)	75	Now on sale/Ticketron
26–28	Consumer News	76–77	Filmex
29–30	Garden Tips	78–79	Dining discoveries
31	Emergency Phones	80	Closed caption program guide
32	Crime Report	81	Help!

In late 1981, KNXT and KCET were concluding the first phase of the two-part trial. Both stations had teletext magazines on the air, but only about 15 teletext-equipped television sets were available for reception of the signals. The second part of the trial will see the deployment of the remaining 80 or so sets and will end in 1982 or 1983 with a market survey to examine consumer demand, teletext usage, and magazine content. The CBS network held a meeting for affiliated stations in September 1981 to discuss the trial and to caution stations not to leap too quickly into teletext services. On the other hand, CBS suggested that teletext could well be advertiser-supported by attracting the type of advertising that usually goes to newspapers (i.e., the current revenue base for television stations would not suffer). Regarding a national teletext service, which CBS announced in mid-1982, CBS officials have described a National Teletext Center that will feed teletext pages to the 200 affiliated stations. The affiliates will be able to add their own pages of local news and advertising. In addition, the CBS plan suggests that advertising agencies and other information providers or suppliers will have their own page creation equipment and will transmit finished pages to the local broadcasting station for insertion into the broadcast teletext magazine.

Rounding out the teletext picture in Los Angeles is the NBC station, a late arrival to the joint project. In mid-1981, after KCET and KNXT were already on the air with Now and Extravision, NBC announced that KNBC–TV would join in. The KNBC magazine is called "Tempo NBC Los Angeles," or simply Tempo, and contains the general interest mix of news, weather, sports, travel information and financial reports, plus items such as health tips, fashion information, and do-it-yourself information (see Table 3.3 and Figure 3.3). The KNBC pages were first broadcast in early 1982. Both NBC and CBS are funding a statistics-gathering method that uses meters in the individual teletext–television sets to record usage. And like CBS, NBC has announced that the Los Angeles teletext experience will form the basis for a national teletext service on the network. Both NBC and CBS also support a subset of the North American Broadcast Teletext Standard for transmission and display parameters (see Chapter 5 for more dis-

Figure 3.3. Sample page from KNBC's teletext service. *(Courtesy of the National Broadcasting Company.)*

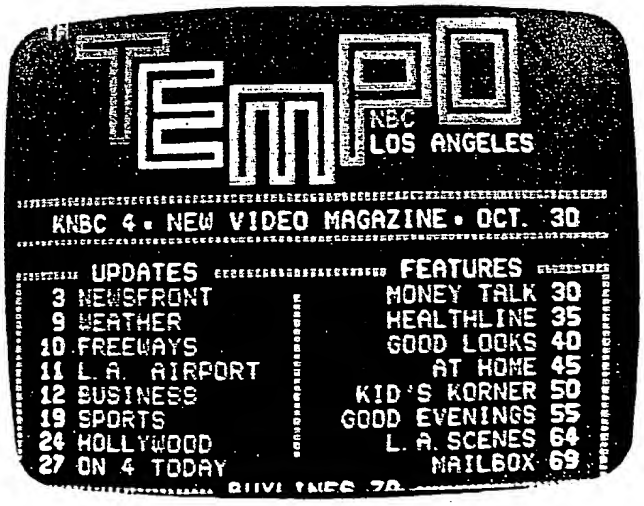


Table 3.3. Sample Contents for KNBC's Teletext Magazine

Page	Department	Page	Department
1	Inside Today	30–34	Money Talk personal finance tips
2	Contents page	35–39	Healthline personal health tips: exercise and diet information
3	Newsfront top news story	40–44	Good Looks fashion, beauty, and personal appearance information
4–8	Newsfront national, world, state and local news	45–49	At Home do-it-yourself information; tips on car care, plant care, and home decorating; recipes
9	Weather general forecast, air quality	50–54	Kids Korner word games, riddles, educational information on subjects of interest to children, such as astronomy
10	Freeways traffic conditions	55–63	Good Evenings movie reviews; theater, music, and restaurant listings
11	LA Airport traffic conditions, parking availability, map of airport	64–68	LA Scenes things to do in Los Angeles, including walking and biking tours, festivals, art galleries, and museums
12	Business top business story	69	Mailbox information on where to write "Tempo NBC Los Angeles"; viewers' letters published on Sunday
13–14	Business news briefs	70–78	Buylines full-page ads
15	Stock market summary		
16	Most active stocks NYSE		
17	Most active stocks Amex		
18	Market comment		
19	Sports		
20–21	Sports news briefs		
22–23	Sports scores and schedules		
24	Hollywood top entertainment story		
25	Hollywood news briefs		
26	Hollywood trivia quiz		
27	On 4 Today—listings		
28–29	KNBC program announcements		

cussion of the standards). The North American standard, based on Telidon and the AT&T videotex protocol, permits more finely defined graphics than is possible using mosaic-six graphics. In Los Angeles, NBC has demonstrated this higher level of graphics even though the Los Angeles teletext trials themselves use mosaic graphics.

Chicago

Chicago has been the second city of teletext. Although teletext in Chicago began being broadcast at almost exactly the same time (early 1981) as in Los Angeles, only two television stations are involved, and only one actually provides a teletext service. That one station is WFLD–TV, then owned by Field Enterprises. Probably it is a little unfair to Chicago to rate the city second to Los Angeles in teletext because the WFLD system in 1981 was larger and in some ways more sophisticated in several respects than the Los Angeles arrangement. But Los Angeles is a bigger television market, and three networks were involved, so Chicago has generally not attracted as much attention.

Field Enterprises became interested in teletext in early 1980 and decided to purchase the most complete teletext system then available. Because the system that had the most experience and was the most developed was the one in use at the BBC, Field personnel visited England, examined the system, and bought a similar one for use at WFLD. During the course of 1981, WFLD, through the teletext subsidiary of Field Electronic

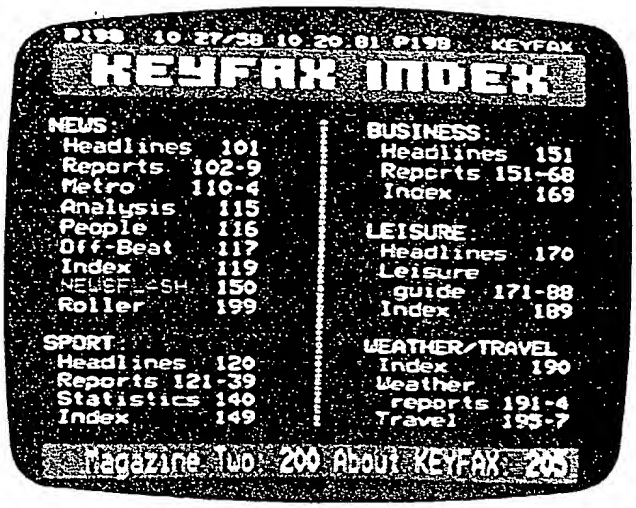


Figure 3.4. Sample page from WFLD's teletext service. *(Courtesy of Keycom Electronic Publishing.)*

Publishing, began broadcasting not only a teletext magazine but also teletext pages as normal video during otherwise off-air time periods (e.g., after midnight) and began testing teletext distribution to cable television headends for retransmission on the cable as normal video. (Field Electronic Publishing has since become Keycom Electronic Publishing, owned by the Centel Corporation. This change is addressed in a later section of this chapter.)

The teletext magazine, called "Keyfax," contains the usual mix of news, weather, sports, and entertainment information (see Figure 3.4). In addition, there are games and puzzles, horoscopes, and special interest items (see Table 3.4). The size of the magazine

Table 3.4. Sample Contents for WFLD's Teletext Magazine

Page	Content	Page	Content
100	General index		LEISURE
	NEWS	130	Guide
101	Headlines	131	TV programs
102–105	In detail	132	What's on
106	Analysis	133–135	Reviews
107	Metro	136	Top 10
108	People	137	Horoscopes
109	Off-Beat	138	Recipes
	SPORTS	139	Bull's eye
110	Headlines		WEATHER/TRAVEL
111–118	Results/reports	140	Guide
119	Calendar	141	U.S. weather map
	FINANCE	142	Chicago forecast
120	Headlines	143–145	Travel news
121–124	News/reports		OTHER PAGES
125	Dow Jones	146	News about Keyfax
126–127	Comex	147	Engineering test
128	Forex	148	Detailed index
129	Round-up	149	Rolling pages
		150	News flashes

varies throughout the day but is usually in the neighborhood of 80 to 100 pages. Some of the pages are known as rolling pages, which roll by without the viewer making a specific request. For example, if page 110 is a news story that is long enough to cover several screens, or pages, the pages of the story will automatically appear every 15 or 20 seconds once the viewer selects the first page in the rolling sequence. The amount of time that a rolling page stays on the television screen before the next page in the sequence appears is controlled by the editors at Field Electronic Publishing.

The second service that WFLD broadcasts, "Nite Owl," comes on the air between midnight and 6 A.M. (see Figure 3.5). This service is not really teletext because it is broadcast as a full video signal in place of any other video program. Viewers cannot select pages, but instead merely watch what amounts to a series of rolling pages. The pages are created on the teletext system and then converted to normal video before being broadcast. Everyone within reach of WFLD's signal can view the Nite Owl pages. In order to keep the sequence of rolling pages interesting and understandable, the pages are grouped into logical sequences called "orbits" that last 20 minutes each. In each orbit, some pages appear just to keep the viewer informed of what will be coming up in the next five or ten minutes, and other pages repeat information that is considered of high interest. For example, news, sports, and weather information appear briefly in every 20-minute segment, but each segment has its own predominant orientation, such as sports in one case, or leisure activities in another. The Nite Owl service is operated like a radio station in that an editor is on duty all night, not only to send out the latest news but also to broadcast messages to viewers, either generally to all viewers or specifically to an individual viewer after a request via telephone. Like radio, everyone tuned in is party to the comments of the editor/announcer.

Accompanying the Nite Owl pages of text and graphics is an audio background of "easy listening" music. This combination of text on the screen and unrelated audio was first authorized by the FCC for broadcast stations in October 1980; it applies only to the midnight-to-6 A.M. time period.

One of the unique aspects of WFLD's teletext and pseudoteletext services is that they

Figure 3.5. Sample page from Nite Owl, a nonteletext broadcast of teletextlike pages. *(Courtesy of Keycom Electronic Publishing.)*

are operated under a commercial authorization from the FCC. This means that WFLD can (and does in some cases) charge for the service through either the rental of teletext-equipped television sets or paid advertising. The teletext–television sets used in Chicago were manufactured specifically for that purpose by Zenith Radio Corporation; Field Electronic Publishing purchased about one hundred of the sets for distribution to viewers, both on a nonfee and a fee basis. During 1981, before all the sets were actually available, Field tried several rate structures ranging up to $4 per day. The second way to make money, paid advertising, is also in use, particularly on Nite Owl, because the latter service is viewable on all television sets. Advertising rates for Nite Owl ranged from $300 for a single night to $13,650 for a 13-week run. The type of advertising attracted by Nite Owl has been typical of late-night television—a large number of used car dealers.

Aside from the commercial side of WFLD's teletext, the technical arrangement also caused the Chicago venture to stand out. The system not only encompassed a teletext editing facility but also an automatic link to a major Chicago newspaper, the *Chicago Sun-Times*, also owned by Field Enterprises, tapping the newspaper's own computer system. In essence, Field Electronic Publishing established a teletext editorial setup using a Digital Equipment Corporation PDP 11/34 minicomputer system connected by telephone lines to the *Chicago Sun-Times's* computerized newspaper system called Atex, which also uses PDP 11/34 minicomputers. Physically, the teletext editorial facility is in suburban Chicago with two Atex computers and one teletext computer; the facility receives digital information from the newspaper's computers in downtown Chicago, then returns digital information to a teletext transmission computer at WFLD–TV, also in downtown Chicago (see Figure 3.6). A third teletext computer was for a time used as a backup transmission computer. Using the automatic link to Atex, the teletext editors can select stories to be transferred to the teletext system, edit them if necessary, and insert the pages into the broadcast cycle, whether as new pages or as replacements for existing pages.

The teletext system itself, like the one at the BBC, can hold thousands of pages in an online library, available to the editors at will, and can hold up to 16 separate magazines of a hundred pages each, which can be swapped in and out of the broadcast cycle either in response to immediate commands or under control of prestored commands. Also like the BBC's Ceefax, Field Electronic Publishing runs the service in a newsroom fashion, with a team of editors ready to put stories on the air as soon as they appear on wire services or via the Atex link. It is not surprising, then, that Field hired several ex-Ceefax editors to help run Keyfax and Nite Owl.

The appearance of the teletext pages in Chicago are nearly the same as in Los Angeles with regard to format and graphics. In Chicago, WFLD uses a screen format of 24 rows of 40 characters with the mosaic-six style of graphics.

In late 1981, Field Electronic Publishing began negotiations with several cable television systems to place teletext–television sets with cable subscribers. This would permit the Keyfax service to be seen outside WFLD's broadcast range and give the station an identifiable audience for the subsequent market research planned by Field.

In early 1982, Field Electronic Publishing became Keycom Electronic Publishing, a joint venture owned primarily by Centel Corporation, with minority ownership by Honeywell, Inc., and, to a lesser extent, Field Enterprises. The real effect of this change on WFLD's teletext service remains to be felt, as the old Field Electronic Publishing staff and system continue to function as before. WFLD–TV, which by itself is not part of Keycom, has continued to broadcast Keyfax and Nite Owl, although WFLD itself has

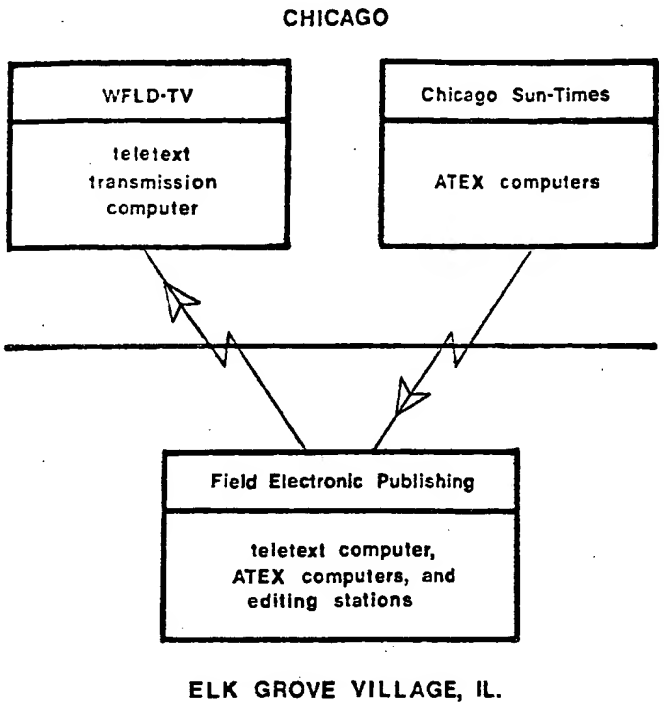


Figure 3.6. Diagram of the telecommunications links from the *Chicago Sun-Times* to the Field/Keycom teletext facility to WFLD–TV.

been sold to Metromedia and there have been rumors that WFLD would like to drop Nite Owl in favor of a normal video all-night news service, and consequently Nite Owl might move to the Chicago PBS station, WTTW. Aside from the teletext service, keycom's primary goal is to establish a videotex service using Honeywell terminals.

The second station in Chicago to broadcast teletext (on a far smaller scale) was WGN–TV, owned by the Tribune Company. In fact, WGN did not set out to produce a real teletext service but only a small series of pages for test purposes. Its microcomputer-based system was built by Zenith and modeled on the British technology. The notable aspect of WGN's entry into teletext was not the size, nor the announced plans to broadcast news, sports, and business data, but the fact that WGN is a superstation carried via satellite by United Video to cable television headends across the country. Specifically, WGN said that it intended to place teletext–television sets in Albuquerque, New Mexico, on a cable television system owned by the WGN group of companies. As previously described, however, United Video had its own plans for WGN's vertical blanking interval (i.e., as a means for disseminating the Dow Jones Newswire and other data to cable systems). In order to do so, United Video stripped off the WGN teletext data and inserted the Dow Jones data into the WGN signal.

WGN sued United Video for copyright infringement, claiming that the teletext data were related to the video programming, and specifically to the evening news. But in October 1981, WGN lost in district court, with the judge ruling that United Video was a passive carrier not "performing" the teletext data and thus not violating the Copyright Act of 1976. The court supported United Video's claim that if WGN wanted to use the

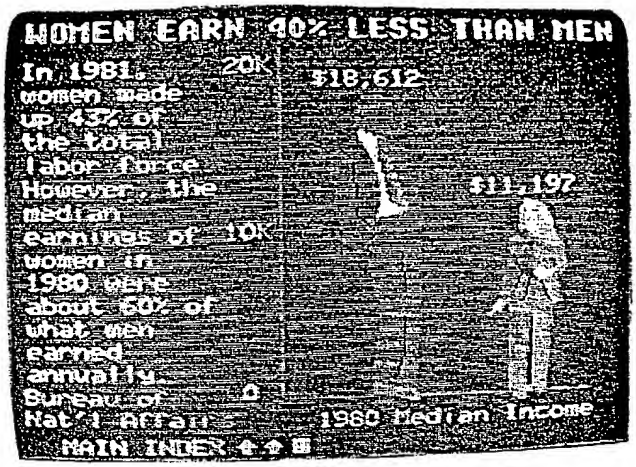


Figure 3.7. Sample page from WETA's teletext service. *(Courtesy of, and page designed by, the Alternate Media Center, Tisch School of the Arts, New York University.)*

vertical blanking interval to transmit data, the station should arrange for, and pay for, the transmission as a service wholly apart from carriage of WGN's video programming. The case left the ownership of the vertical blanking interval in a legal twilight zone, however because the case was actually resolved on copyright grounds. And to complicate matters, in late 1982 an Appeals Court reversed the earlier decision and said that United Video had to carry program-related teletext, but not necessarily other types of teletext. In turn, United Video has appealed that decision.

Washington, D.C.

In Washington, D.C., the teletext trial of WETA–TV is distinguishable from the other trials by the presence of public funding—the money to run the trial came directly from several federal agencies. Although the published objectives of the trial are to test the public's desire for teletext (if it exists) and not to test the technology, the WETA trial chose a system not in use anywhere else in the United States, namely, the Canadian Telidon system. (See Figure 3.7 for a sample WETA teletext page.)

The planning for the WETA trial got underway in earnest in 1980 primarily at the Alternate Media Center at New York University, under the sponsorship of the Corporation for Public Broadcasting and the National Telecommunications and Information Administration. At that time, the decision to use the Washington PBS station as the site for the trial had already been made, but no decision on the technical system to use was made public, although a published report seemed to favor the Canadian system over the French and especially over the British system [8].

In June 1980, the trial was officially announced as a project of the Alternate Media Center in association with WETA and funded by the Corporation for Public Broadcasting, the National Science Foundation, the National Telecommunications and Information Administration, and the U.S. Department of Education. Exactly how the publicly funded project went about selecting the Canadian system is not very clear, because there does not seem to have been an unbiased procedure for requesting and evaluating proposals. A news report at the time suggested that both the French and the British systems were never seriously considered, and that Zenith, along with the British, eventually